Why 6 milliseconds

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Why record 3 drift-times

The reason for the interval between 0 and 2 milliseconds is obvious. To see why one needs the full 6 milliseconds, consider a particle entering the detector near the anode (readout planes) 1.9 milliseconds *before* the beam-spill and crossing the full drift region to the HV cathode. The electrons from the section of track near the readout planes will reach the wires before the beam spill and the signals they produce are clearly associated with an out-of-time particle. As the particle moves away from the wires towards the cathode, however, a point will be reached after which the drifting electrons arrive at the wires *after* the beam spill and must be considered relevant. In this case, signals from electrons with drift time greater than 1.9 milliseconds, ie in the region within 0.1 milliseconds of the cathode, will be recorded in the standard readout interval. A particle whose trajectory near the cathode is what is actually recorded would appear as a particle materializing in the body of the detector, starting (transversely) at the anode wires and moving a distance of 15 cms (0.1 milliseconds of drift) away.

Similarly, consider the electrons from a track which enters the detector near the cathode (HV plane) 1.9 milliseconds after the beam-spill and crosses the drift-volume to the anode (readout). The electrons drifting in from the point of entry will take 3. 9 milliseconds to reach the anode wires and hence their signals are, again, clearly associated with an out-of-time particle. Once, however, the track is close enough to the anode wires that the electrons take less than 0.1 milliseconds to reach the wires, the electrons will arrive in the valid time window. Such a particle is actually recorded when it is close to the anode but it will appear to start at the cathode, progress till it is 15 cms away from the cathode - and vanish.